

BEST AVAILABLE COPY

Japanese Patent Publication

Japanese Patent Publication # Hei 6-2177

Application number: Tokugan Syou 61-97650

Date application filed: April 26, 1986

Inventor: Shimizu Kunihiro (Mr.)

Applicant: KK L.I.C.

Date, application disclosed to public: November 6, 1987

Date, issued publication gazette: January 12, 1994

Japanese Patent Publication No. Hei6-2177

(Title of the Invention) Rotating Type Game Machine

(What is Claimed is)

(Claim 1)

A rotating type game machine comprising:

(a) main game means comprising at least three pattern reels for displaying a suitable number of different patterns on their circumferential faces, and first drive devices provided respectively to the pattern reels for rotating the pattern reels;

(b) sub-game means comprising a rotator with a suitable number of different marks displayed on its surface, and a second drive device for rotating the rotator;

(c) first stop means for providing stop signals individually to each of the first drive devices by a human operation;

(d) first detectors for respectively detecting stop positions of the pattern reels when the rotations of the pattern reels are stopped;

(e) main game-judging means for determining winning or loss on the basis of detection signals from the first detectors and transmitting a start signal of the sub-game when a specified winning combination of patterns is hit;

(f) second stop means for providing a stop signal to the second drive device by a human operation;

(g) a second detector for detecting a stop position of the rotary when the rotation thereof is stopped;

(h) sub-game judging means for judging winning or loss on the basis of a detection signal from the second detector; and

(i) hopper driving means for driving a hopper to pay dividend tokens out when a signal of the main game judging means or a signal of the sub-game judging means is inputted.

[Detailed Description of the Invention]

[Field of Industrial Applicability]

The present invention relates to a rotating type game machine such as a slot machine in typical, and particularly relates to a rotating type game machine realizing more interesting games.

[Prior Art]

A rotating type game machine such as a slot machine usually comprises three pattern reels with a number of patterns displayed on their circumferential surface respectively. The reels are rotated, and then stopped at random when the players pushes the stop buttons provided to each of the pattern reel. Then the winning is judged according to the combination of patterns on predetermined winning lines. In the case of winning, a predetermined number of tokens are paid back.

Fig. 8 is a schematic front view of the above-described conventional rotating type game machine (2) and Fig. 9 shows the winning lines on a front panel (21) and the pattern reels seen from reel windows.

The rotating type game machine (2), which is also called a slot machine, has a box housing wherein three pattern reels (1), (2), (3), motors for rotating the reels, and other control

devices are contained. A random sequence of, for example twenty-one patterns of seven kinds, is shown on the outer peripheral surface of each of the pattern reels (1), (2), (3). Further, in the upper front panel (21), reel windows (22) permitting a player to see the patterns on the pattern reels (1), (2), (3); a start switch (10) for rotating the pattern reels (1), (2), (3); stop buttons (11), (12), (13) for individually stopping the rotations of the pattern reels (1), (2), (3); a token slot 9 and line indicators (23) for indicating the positions and the number of winning lines are arranged.

In the game machine (2), there are five winning lines corresponding to three columns of patterns on pattern reels (1), (2), (3) appearing in the reel windows (22). A predetermined number of winning lines on the predetermined positions are selected mechanically from the above-mentioned five winning lines upon the number of the inserted tokens. Specifically, when a player insert one token into the token slot (9), only the central line (I) is defined as the winning line, when the number of the inserted token is two, the central line (I), upper line (IIa) and lower line (IIb) are defined as the winning lines; when the number of the inserted tokens is three, five lines, i.e., the central line (I), upper line (IIa), lower line (IIb) and slant lines (IIIa), (IIIb) are defined as the winning lines.

Accordingly, when the player plays a game with the game machine (2), one, three or five winning lines are selected according to the number of the tokens inserted into the token slot (9) by the player, and the line indicators (23) are lighted on to show the player the positions and the number of the winning

lines. Then, the player pushes the start button (10) to rotate the pattern reels (1), (2), (3) thus starting the game. Thereafter, as shown in Fig. 10, when the stop buttons (11) (12) (13) are pushed at random order (201), the pattern reels (1) (2) (3) stop rotating, and when all the pattern reels (1) (2) (3) stop (202), the winning or loss is judged upon the combinations of the stopped patterns on the winning lines (203), and in the case of winning, a predetermined number of tokens are paid (204). This game is referred to as the main game hereinafter.

The rotational speed of the pattern reels (1) (2) (3) is set to an extent that the patterns on the outer peripheral surfaces of the reels are hard to be read clearly so that the player has to push the stop button (11) (12) (13) at random in general cases while it is somewhat possible for a player to stop the pattern reels at aimed positions. Therefore, such a kind of rotating type game machine can realize exciting games since it stirs up the speculative spirit of a player.

In order to further improve the level of the excitement of the game, a continuous accessory game is also provided to be executed with one of the pattern reels in addition to the above-described main game. The continuous accessory game is usually called a small bonus game wherein the pattern reels are rotated and stopped one by one, and if one of the reels stops at a pattern which is designated as the target of the continuous accessory game, a predetermined number of tokens are paid.

The continuous accessory game is designed to be performed by the operation of a built-in continuous accessory device when

the combination of the patterns is a specified combination among the winning combinations of the main game. Further, a continuous accessory increasing device may be disposed to increase the number of times of the continuous accessory game itself, i.e., to realize a big bonus game so as to make the game more exciting.

[Problems to be Solved by the Invention]

The conventional game machine (Z) is used widely as a game machine for playing very interesting games since it comprises both the contingency of the stopped positions of the pattern reels and the feature that requires the skill of a player to stop the reels at aimed positions.

On the basis of earnest researches in respect to game machines for realizing interesting games, the present inventors found that more exciting games can be realized by using means other than the pattern reels to provide the chances of the small or big bonus game (referred to as accessory game hereinafter) when a specified winning combination of patterns is hit in the main game.

The present invention provides a new rotating type game machine which is attained based on the above-mentioned finding.

[Means for Solving the Problems]

The rotating type game machine of the present invention will be described hereinafter with reference to Fig. 1.

The rotating game machine according to the present invention comprises:

(a) main game means comprising at least three pattern reels (1)(2)(3) for displaying a suitable number of different

patterns on their circumferential faces, and first drive devices (5) (6) (7) provided respectively to the pattern reels (1) (2) (3) for rotating the pattern reels (1) (2) (3);

(b) sub-game means comprising a rotator (81) with a suitable number of different marks displayed on its surface, and a second drive device (84) for rotating the rotator (81);

(c) first stop means (11) (12) (13) for providing stop signals individually to each of the first drive devices (5) (6) (7) by a human operation;

(d) first detectors (15) (16) (17) for respectively detecting stop positions of the pattern reels (1) (2) (3) when the rotations of the pattern reels are stopped;

(e) main game-judging means (31) for determining winning or loss on the basis of detection signals from the first detectors (15) (16) (17) and transmitting a start signal of the sub-game when a specified winning combination of patterns is hit;

(f) second stop means (14) for providing a stop signal to the second drive device (84) by a human operation;

(g) a second detector (87) for detecting a stop position of the rotary when the rotation thereof is stopped;

(h) sub-game judging means (32) for judging winning or loss on the basis of a detection signal from the second detector (87); and

(i) hopper driving means (33) for driving the hopper to pay dividend tokens when a signal of the main game judging means (31) or a signal of the sub-game judging means is inputted.

The rotator (81) may in any form that displays figures

or patterns on its surface, for example, a disc showing figures or patterns circumferentially on its surface, a reel showing figures or patterns on its outer face, or the like.

[Function]

In the present invention, three pattern reels (1) (2) (3) are rotated by the first drive devices (5) (6) (7). When the first stop means (11) (12) (13) are operated by a player after the rotations are started, the three pattern reels (1) (2) (3) stop at the positions corresponding to the timings of the stop operations. The stop positions of the pattern reels (1) (2) (3) are detected respectively by the first detectors (15) (16) (17).

Then, when one main game is finished, the main game judging means (31) determines, on the basis of the stop signals from the first detectors (15) (16) (17), whether the stopped patterns of the pattern reels (1) (2) (3) are in winning combinations, and transmits a start signal of the sub-game when a specified winning combination is hit.

The sub-game is started with the starting of the rotation of the rotary (81) based on the start signal. The rotation of rotary (81) is stopped by the operation of the second stop means (14), and the sub-game judging means (32) judges whether the marks displayed when the rotation is stopped have a combination deemed to win. When an ordinary winning is hit in the main game, the hopper drive means (33) operates at this point of time to pay the dividend tokens thus finishing the game without moving to the sub-game. In the case of a specified winning being hit in the main game, the dividend token for the main game is paid and the game is transferred to the sub-game. When the prize

is also gained in the sub-game, a continuous accessory device or a continuous accessory increasing device operates at this moment to allow the player to enjoy a small or a big bonus game. If no prize is gained in the main game, the game is finished without any dividend token paid, and if no prize is gained in the sub-game, the game is finished as it is and the machine returns to the initial state.

[Embodiment]

The embodiments of the present invention will be described hereinafter.

Fig. 1 is a view for explaining the functions of the invention; Fig. 2a shows a front panel of the rotating type game machine according to Embodiment 1 of the present invention; Fig. 2b to 2d are front views of a main element of a disk forming the rotator; Fig. 3 is an electric circuit diagram of Embodiment 1; Fig. 4 is a flow chart showing the content of the game in Embodiment 1; Fig. 5 is a flow chart showing the content of the game in Embodiment 2; Fig. 6 is a flow chart showing the content of the game in Embodiment 3; and Fig. 7 is a view for explaining a sub-reel as the rotator of Embodiment 4.

Embodiment 1

In Fig. 2a, (21) is the front panel of a slot machine according to the present embodiment. Three reel windows (22) are arranged at the center of the front panel (21), and three rows of the patterns on the pattern reels (1) (2) (3) for the main game can be seen from these windows. The patterns (for example twenty-one patterns of seven different designs) are displayed in rooms defined at the same pitch on the outer peripheral

surfaces of the reels. The pattern reels (1) (2) (3) are supported by a frame in the main body, and stepping motors (5) (6) (7) acting as the first drive devices are connected respectively to the rotation axis of the reels. DC motors, AC motors or the like can also be used as the first drive devices. (I), (IIa), (IIb), (IIIa) and (IIIb) are the winning lines, and their directing lines are displayed on the reel windows (22).

Further, in the upper portion of the front panel (21), a disk (81) is arranged as the rotator for the sub-game. The disk (81) is supported by the frame in the main body, and a stepping motor (84) acting as the second drive device is connected to the rotation axis of the rotator. A DC motor and AC motor can also be used as the second drive device.

The disk (81) is formed to have small rooms defined circumferentially on the disk surface wherein some of the rooms are filled out with figures from 1 to 12 respectively while the others are blank as shown in Fig. 2b. Alternatively, single circles and double circles are displayed instead of the figures as shown in Fig. 2c, or the patterns such as crowns or stars are displayed instead of the circles.

A stop marker (71) for indicating only one figure or one pattern is provided to the upper portion of the disk (81). Since probability of winning the sub-game is determined by the ratio of the winning marks to the total number of the small rooms, the number of the winning marks may be determined in accordance with the probability of winning to be set. For example, in the case of the disk as shown in Fig. 2b, the odd numbers displayed in six rooms are assigned to the continuous accessory winning,

the even number in six rooms the continuous accessory increasing winning, and eight blank rooms the loss. Further, in the case of the disk as shown in Fig. 2c, the single circles displayed in six rooms are assigned to the continuous accessory winning, the double circles in six rooms the continuous accessory increasing winning, and eight blank rooms the loss.

The disk (81) in the description hereinafter refers to the disk shown in Fig. 2b, and the disk (81) shown in Fig. 2c should be understood similarly.

In addition to the above-mentioned elements on the front panel (21), it further contains a jackpot display (24) for indicating the number of the tokens to be paid for winning; a token slot (9) to which a predetermined number of tokens are inserted for every game; a start switch (10) for actuating the pattern reels; stop buttons (11) (12) (13) respectively provided to the pattern reels (1) (2) (3) for stopping the rotations of the pattern reels; and a stop button (14) for stopping the disk (81).

Next, the electric circuit is described with reference to Fig. 3. 30 is a microcomputer for controlling entirely the slot machine. The microcomputer (30) performs necessary comparison and judgment so as to progress the game. The microcomputer (30) comprises a CPU for outputting the results of the comparison and the judgment as control signals; a program for determine the procedures of the comparison/judgment in the CPU and the execution sequence thereof; ROM for storing the combination data of the stopped winning patterns and stopped winning figures necessary for determining the winning of the

main game and the sub game; RAM for storing other data; an input port (35) for timing external signals and internal signals and selecting input and output signals; and an output port (36) for outputting control signals.

The stepping motors (5) (6) (7) are connected to the output port (35) via a drive circuit (38). When a pulse control signal is transmitted from CPU, a drive signal is transmitted from the drive circuit (38) to rotate the stepping motors (5) (6) (7).

The start switch (10), stop buttons (11) (12) (13), position detecting sensors (15) (16) (17) and token detector (41) are connected to the input port (36). An actuation circuit (47) and a stop circuit (48) are respectively mounted in the signal line of the start switch (10) and the signal line of the stop buttons (11) (12) (13). The position detecting sensors (15) (16) (17) detect a reset signal portion provided on each of the circumference of the pattern reels (1) (2) (3), and they are formed by, for example photosensors to transmit reset signals once a rotation of the pattern reels (1) (2) (3).

The token detector (41) detects the insert of tokens to the token slot (9) and the number of the inserted token. A microswitch or a photosensor is used as the token detector (41).

The stepping motor (84) for rotating the disk (81) is connected between the output port (35) and the input port (36). The stepping motor (84) rotates upon a drive signal transmitted from a drive circuit (39) when a control signal is transmitted from CPU. When the drive signal is stopped by pushing the stop button (14), the stepping motor (84) stops rotating. The position detecting sensor (87) is formed, for example by a

photosensor, to detect a reset signal provided on one place of the circumference of the disk (81) and transmits a reset signal once a rotation of the disk (81).

Further, the hopper (42) for paying the dividend tokens when the player wins the game; a speaker (43) for spreading melodies with different tones during the rotations of the pattern reels (1) (2) (3) and when the player wins the game; and the jackpot display (24) for indicating the number of the winning tokens are connected to the output port (35) via the drive circuits (44) (45) (46) respectively.

In the present embodiment, when a player insert tokens to the token slot (9) in the state that the power supply is on, the detecting signal thereof is transmitted from the token detector (41) to CPU, then CPU turns the slot machine to a working state and transmits a drive signal to the speaker (43) to spread predetermined melody.

In this state, when the player pushes the start switch (10), an actuation signal is caught by CPU from which drive signals are transmitted simultaneously to the stepping motors (5) (6) (7), and the pattern reels (1) (2) (3) start to rotate together. Thereafter, when the player pushes the stop buttons (11) (12) (13), stop signals are caught by CPU, and the drive signals from CPU are stopped immediately, thus the rotations of the pattern reels (1) (2) (3) are stopped.

Since the stepping motors (5) (6) (7) reacts agilely to the drive signals, they stop almost simultaneously with the action of pushing the button by the player. Therefore, the player can freely select the order and the intervals of the pushing

operations of each of the stop buttons (11) (12) (13) so as to stop the pattern reels (1) (2) (3) at desired positions.

The main game judging means (31) and the sub-game judging means (32) can be realized by the software processing with the microcomputer (30).

The judgment of the winning of the main game is performed as described hereinafter. CPU counts the number of pulses of the driving signals during a period from the point of time when a final reset signal among the reset signals inputted from the position detecting sensors (15) (16) (17) at every rotation of the pattern reels (1) (2) (3) is inputted until the transmissions of the drive signals to the stepping motors (5) (6) (7) are stopped due to the input of the stop signals. Since the number of the pulses of the drive signals needed in rotating one room of the pattern displayed on each of the pattern reels (1) (2) (3) is previously known, it is possible to judge which rooms stop and appear in the reel windows (22) on the basis of the counted number of pulse. Several kinds of combinations of patterns for winning are stored in a predetermined area of ROM for judging the winning or loss. CPU compares the counted number of pulses as an index with the information in ROM. If the comparison results shows the conformity, CPU determines that the player wins the game and further determines the kinds of the winning.

For judging the winning of the sub-game, the stopped figure on the disk (81) is, similar to the case of the pattern reels (1) (2) (3), detected in CPU on the basis of the reset signal from the position detecting sensor, and it is compared with the winning combination stored in ROM to judge whether the player

wins or loses the game.

After the judgments of the main game and the sub-game, a drive signal is transmitted from CPU to the hopper thus driving the hopper to pay tokens.

The content of the game in the above-described embodiment will be explained with reference to Fig. 4.

When a player inserts tokens to the token slot (9) in the state that power supply is turned on and pushes the start button (10), the pattern reels (1)(2)(3) begin to rotate thus the game is started (101). Thereafter, if the player pushes the stop buttons (11)(12)(13) at random (102), the pattern reels stop at the positions corresponding to the operations of the stop buttons thereof respectively (103). At this time, the winning judgment is carried out (104), and if the player does not win the game, the game is finished.

In the embodiment shown in Fig. 4, the winnings of the continuous accessory and the continuous accessory increase in a conventional game machine are removed from the main game in the present embodiment. The game is transferred to the sub-game when a specific winning is hit thus providing chances of gaining the prizes of the continuous accessory and continuous accessory increase in the sub-game. When the specific winning is hit, the disk (81) begins to rotate (105) thus starting the sub-game. In the present embodiment, the dividend tokens for the specific winning is paid (106) after the sub-game starts, but, as a matter of course, the tokens may be paid before the start of the sub-game, namely right after the finish of the main game. When the player pushes the stop button (14) (107), the disk (81) stops rotating.

Then, it is judged by the microcomputer (30) that the continuous accessory increase (big bonus) is gained if the stopped figure is an even number, the continuous accessory (small bonus) is gained if the figure is an odd number, and no prize is gained if the disk (81) stops at a blank room (108). If no prize is won in the sub-game, the game finishes immediately, while if the prize is won, the continuous accessory device or the continuous accessory increase device operates to permit the player to enjoy the small bonus game (109) or the big bonus game (110).

Very interesting games can be played with the above-mentioned embodiment since it comprises the main game expressed by the steps (101) to (104) and the sub-game expressed by the steps (105) to (110) as shown in Fig. 4.

Embodiment 2

Embodiment 2 will be described with reference to Fig. 5. The portions in respect to the main game are omitted in Fig. 5 since they are similar to those in Embodiment 1. Fig. 5 shows the steps from stop (104) in Fig. 4.

In the present embodiment, the prize for the continuous accessory (small bonus) is remained in the main game, while only the prize for the continuous accessory increase (big bonus) can be gained in the sub-game. Specifically, the winning patterns of the continuous accessory increase are eliminated from the pattern reels (1) (2) (3).

In this embodiment, the disk (81) shown in Fig. 2d is preferable. Several small rooms are defined circumferentially on the disk (81), a suitable number of the rooms are filled out

with a specific figure, for example "7," and the others are blank. If the room with the figure stops at the position of the stop mark (71), the prize is gained, and if a blank room stops at the position of the stop mark (71), no prize is gained. The patterns such as a crown may be used instead of the figure. In the case of this disk, the probability of winning the sub-game is 50%.

The winning judgment of the main game is carried out in step (104). When a predetermined prize is gained, the disk (81) rotates (105) to start the sub-game, and at the same time the dividend winning tokens are paid (106). Next, when the player pushes the stop button (14) (107), the disk (81) stops rotating, the winning judgment of the sub-game is performed by the microcomputer (30) on the basis of the combination of the stopped figures (108). If the judgment shows the winning, the big bonus game is performed (109). If the judgment shows the loss, the game is finished. If the winning for the continuous accessory is hit according to the judgment for the main game (104), the dividend winning tokens are paid and the small bonus game is performed.

Embodiment 3

The present embodiment will be described with reference to Fig. 6. The portions in respect to the main game are omitted in Fig. 6 since they are similar to those in Embodiment 1. Fig. 6 shows the steps from stop (104) in Fig. 4.

In the present embodiment, the prize for the continuous accessory increase (big bonus) is remained in the main game, while only the prize for the continuous accessory (small bonus)

may be gained in the sub-game. Specifically, the winning patterns of the continuous accessory are eliminated from the pattern reels (1)(2)(3). In this embodiment, the disk (81) shown in Fig. 2d is preferable and the patterns such as a star are preferable.

The winning judgment of the main game is carried out in step (104a). When a predetermined prize is gained, the disk (81) rotates (105) to start the sub-game, and at the same time the dividend winning tokens are paid (106). Then, when the player pushes the stop button (14), the disk (81) stops rotating, the winning judgment of the sub-game is performed by the microcomputer (30) on the basis of the combination of the stopped figures (108). If the judgment result shows the winning, the small bonus game is performed (110). If the judgment shows the loss, the game is finished. If the prize for the continuous accessory increase is gained according to the judgment of the main game in step (104), the dividend winning tokens are paid (111), and the big bonus game is performed (112).

Embodiment 4

The present embodiment will be described with reference to Fig. 7. In this embodiment, a sub-reel (82) is used as the rotator of the sub-game means. The form of the sub-reel (82) is almost similar to that of the pattern reels (1)(2)(3) while the size may be smaller. Figures or patterns are displayed on the circumferential face of the sub-reel (82), and a portion thereof appear in a reel window (72).

In the present embodiment, if a predetermined winning figure of patterns stop at the position of a stop mark (73)

provided to one side of the reel window (72), the judgment shows that the players wins the game.

Embodiment 5

In any of the above-described embodiments, the transmission of the control signal to the disk (81) or the sub-reel (82) is stopped by the operation of a stop button (14) as shown in Fig. 1, while it is also possible to transmit a stop signal automatically when a predetermined period of time (for example, 2 to 3 seconds) has lapsed without providing any stop button.

The present invention is not limited to the above-described embodiments but can be various modifications within a scope not departing from the spirit of the present invention.

[Effect of the Invention]

According to the present invention, a player can enjoy interesting games since he or she can not only gain prizes in the main game but also have chance to play the sub-game.

[Brief Description of the Invention]

Fig. 1 is a view for explaining the functions of the invention; Fig. 2a shows a front panel of the rotating type game machine according to Embodiment 1 of the present invention; Fig. 2b to 2d are front views of a main element of a disk as the rotator; Fig. 3 is an electric circuit diagram of Embodiment 1; Fig. 4 is a flow chart showing the content of the game in Embodiment 1; Fig. 5 is a flow chart showing the content of the game in Embodiment 2; Fig. 6 is a flow chart showing the content of the game in Embodiment 3; and Fig. 7 is a view for explaining a sub-reel as the rotator in

Embodiment 4.

[Explanation of Main Reference Numerals]

- (1) (2) (3): pattern reel
- (5) (6) (7) (84): stepping motor
- (10): start switch
- (11) (12) (13) (14): stop button
- (15) (16) (17) (87): position detecting sensor
- (30): microcomputer
- (31): main game judging means
- (32): sub-game judging means
- (33): hopper driving means
- (41): token detector
- (42): hopper
- (81): disk
- (82): sub-reel

(6)

特公平6-2177

11

り小形であってもよい。その円周面上には数字や図柄などの記号が表示され、そのうちの一部分がリール窓(72)中に現われるようになっている。

本実施例では、リール窓(72)の横に設けられた停止マーク(73)の位置で、予め定められた入賞記号が停止したとき、入賞と判定されるようになっている。

実施例5

前記各実施例においては、いずれも円盤(81)や副リール(82)などへの制御信号の発信停止は、第1図に示されている1個の停止ボタン(14)で行っているが、停止ボタンを一切設けなく、一定の時間(たとえば2〜3秒)経過すると自動的に停止信号が発生されるようにしてもよい。

以上に本発明の各実施例を説明したが、本発明はかかる実施例に限られず、その要旨を逸脱しない範囲で種々の変形例を採用することができる。

【発明の効果】

本発明によると、通常ゲームで入賞したときは、たんに入賞配当を手に入れるだけでなく、あわせて副ゲームも行なうことができるので、興趣あるゲームを楽しむことができる。

【図面の簡単な説明】

第1図は本発明の機能説明図、第2a図は本発明の実施例1にかかわる回胴式遊戯機の正面パネルの正面図、第2b

12

〜2d図は回転体を構成する円盤の要部正面図、第3図は実施例1の電気回路図、第4図は実施例1のゲーム内容を示すフローチャート、第5図は実施例2のゲーム内容を示すフローチャート、第6図は実施例3のゲーム内容を示すフローチャート、第7図は実施例4の回転体である副リールの説明図、第8〜9図は従来の遊戯機の説明図、第10図は従来のゲーム内容を示すフローチャートである。

（図面の主要符号）

(1): (2): (3): 絵柄リール

(5): (6): (7):

(84): ステッピングモータ

(10): スタートスイッチ

(11): (12): (13): (14): 停止ボタン

(15): (16): (17):

(87): 位置検出センサ

(30): マイクロコンピュータ

(31): 通常ゲーム判定手段

(32): 副ゲーム判定手段

(33): ホッパ駆動手段

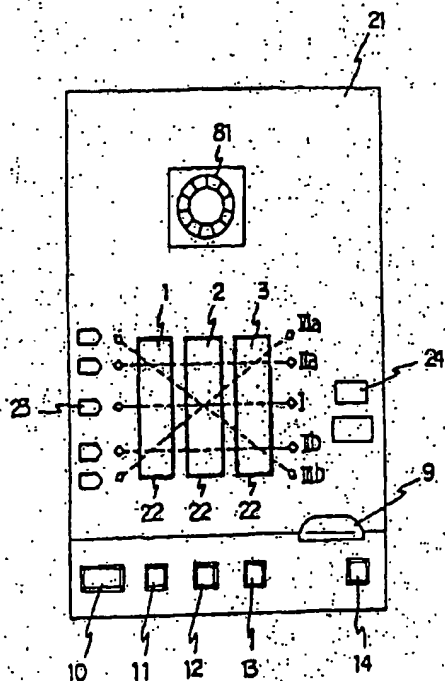
(41): メダル検出器

(42): ホッパ

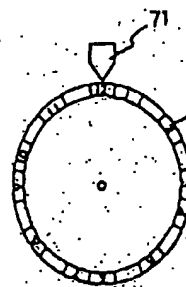
(81): 円盤

(82): 副リール

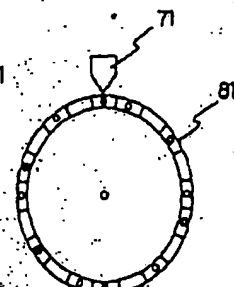
【第2 a 図】



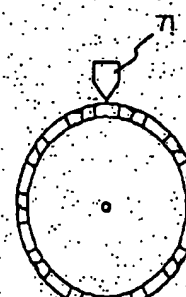
【第2 b 図】



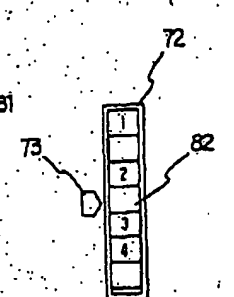
【第2 c 図】



【第2 d 図】

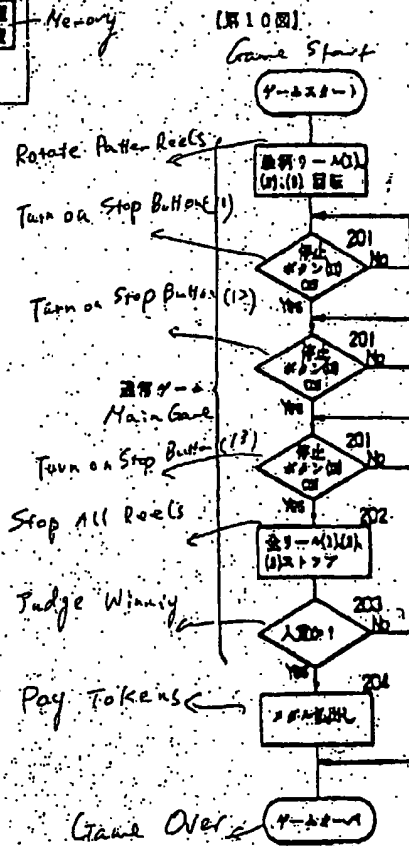
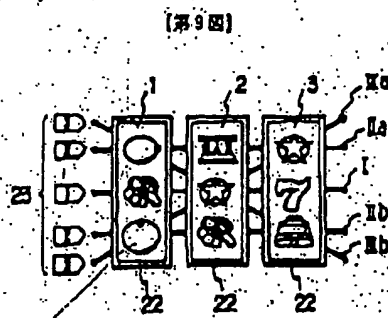
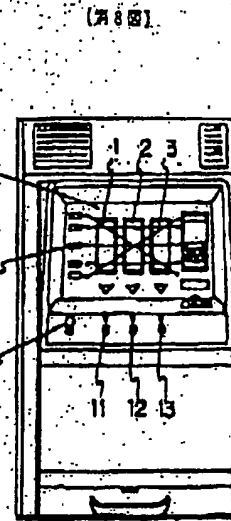
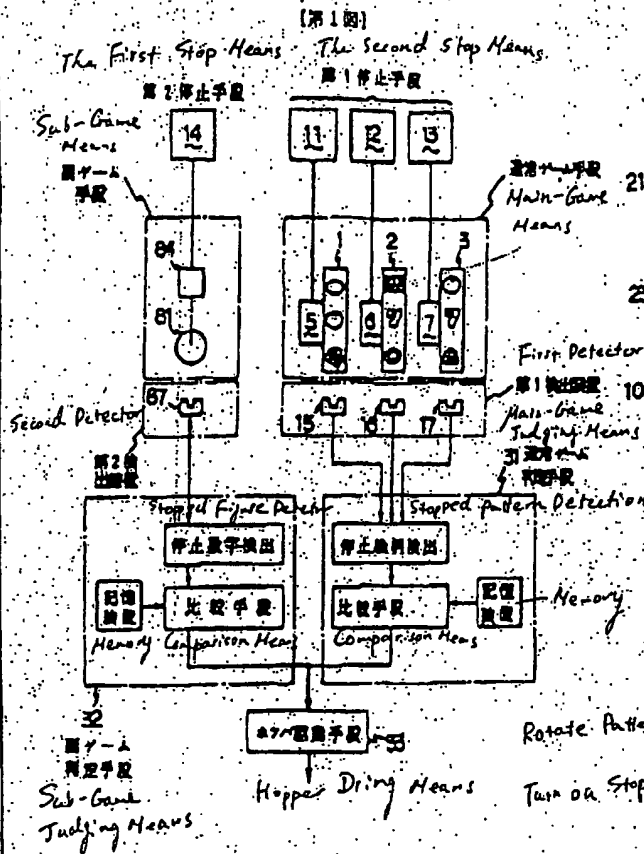


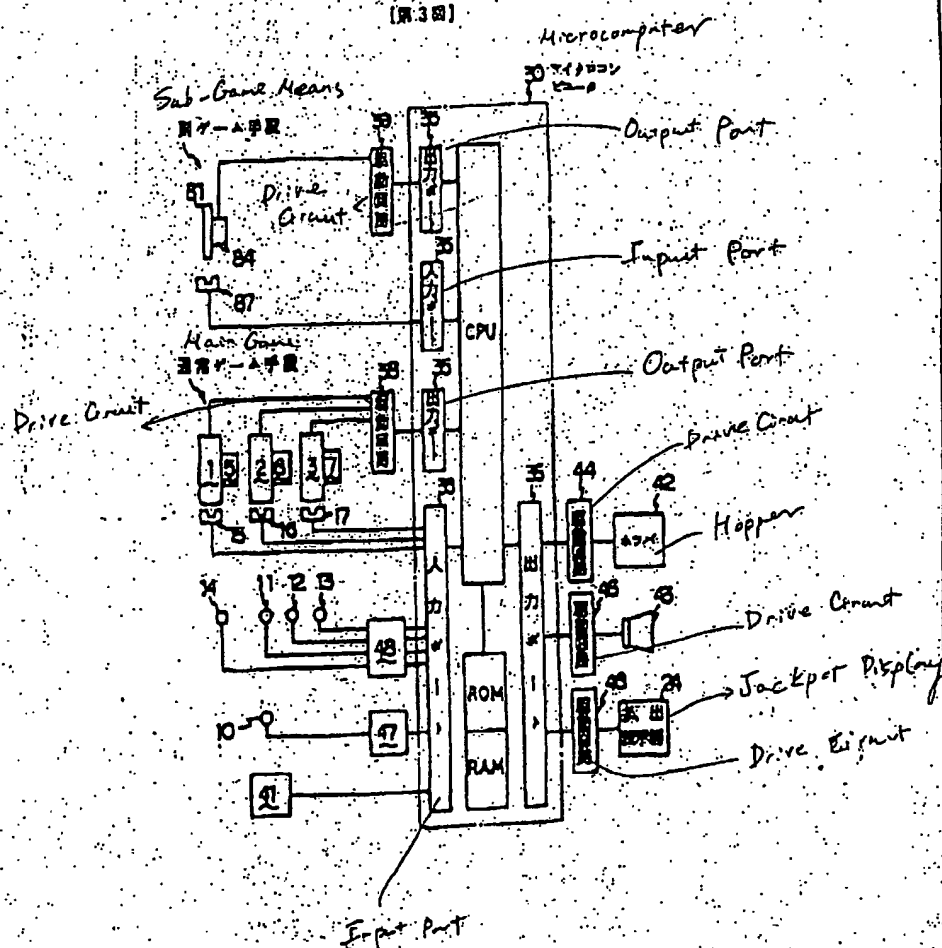
【第7 図】



(7)

特公平6-2177

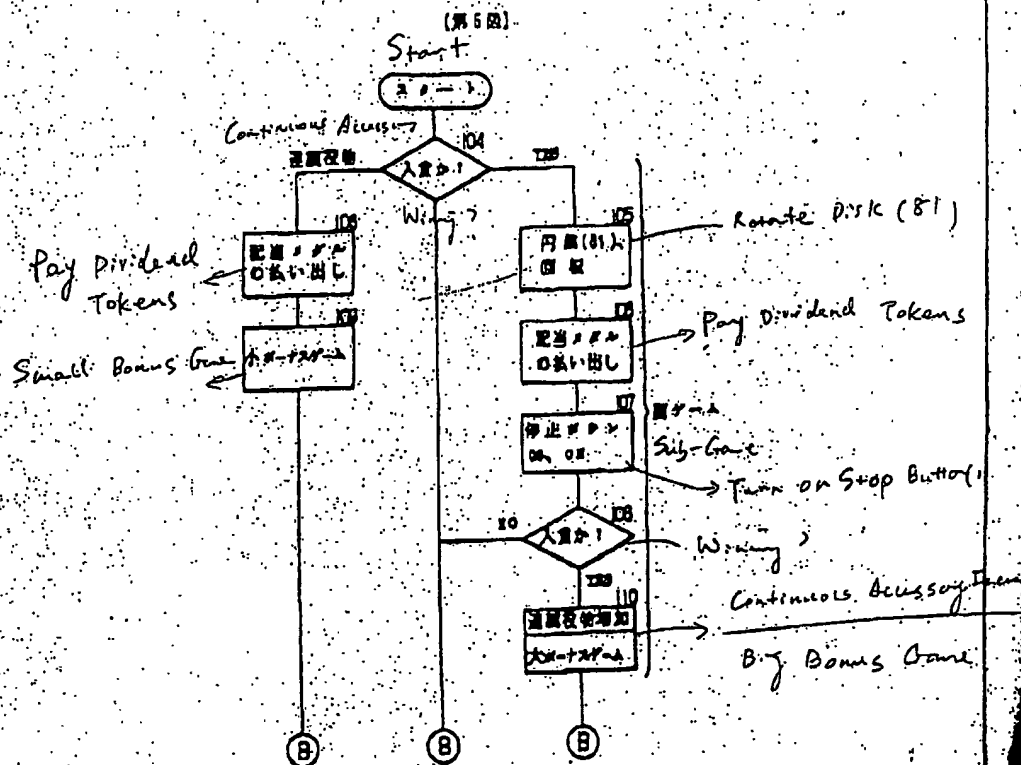




-133-

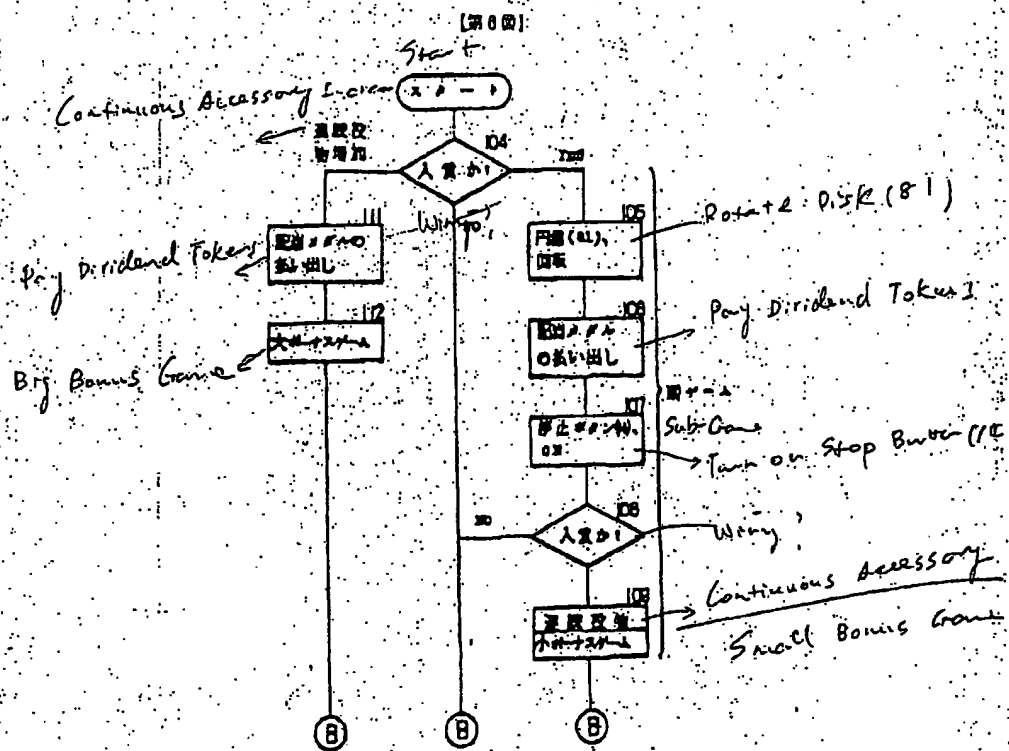
(10)

特公平6-2177



(11)

得公平 6-2.177



Japanese Patent Publication

Japanese Patent Publication # Hei 6-2177

Application number: Tokugan Syou 61-97650

Date application filed: April 26, 1986

Inventor: Shimizu Kunihiro (Mr.)

Applicant: KK L.I.C.

Date, application disclosed to public: November 6, 1987

Date, issued publication gazette: January 12, 1994

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.

(19)



JAPANESE PATENT OFFICE

PATENT ABSTRACTS OF JAPAN

(11) Publication number: **06002177 A**

(43) Date of publication of application: **11.01.84**

(51) Int. Cl.

C23G 1/19

C21D 9/56

C25F 1/06

(21) Application number: **04165050**

(22) Date of filing: **23.08.82**

(71) Applicant: **KAWASAKI STEEL CORP**

(72) Inventor:
ISHIBASHI GENICHI
IKEDA MASA HARU
SATO KUNIAKI
ISOBE TOSHIKI
SONOYAMA KOKICHI

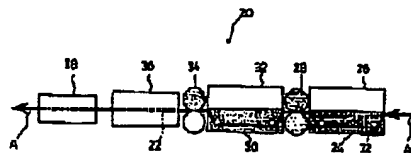
(54) **METHOD AND APPARATUS FOR
CONTINUOUSLY ANNEALING AND PICKING
COLD-ROLLED STAINLESS STEEL SHEET**

COPYRIGHT: (C)1994,JPO&Japio

(57) Abstract:

PURPOSE: To obtain a cold-rolled stainless steel sheet excellent in surface gloss by sufficiently cleaning the surface before annealing the cold-rolled stainless steel sheet and again making the clean surface through picking after annealing.

CONSTITUTION: Before annealing the cold-rolled stainless steel sheet 22, by dipping this sheet into solution 24 containing 0.5-5.0wt.% alkali material and 50ppm-1.0wt.% chelating agent, the rough-washing is executed. Stuck material stuck to the roughly washed cold-rolled stainless steel sheet 21 is electrolytically removed by using the solution containing 0.5-5.0wt.% alkali material and 50 ppm-1.0wt.% chelating agent to execute finish-washing. The solution attached to this finish-washed cold-rolled stainless steel sheet is removed and the cold-rolled stainless steel 22 removing the solution 30 is dried.



BEST AVAILABLE COPY

(11)特許出願公開番号

(43)公開日 平成6年(1994)1月11日

審査請求 未請求 請求項の数 2 (全 6 頁)

(74)代理人 弁理士 小杉 佳男 (外1名)

1

【特許請求の範囲】

【請求項1】 冷間圧延ステンレス鋼板の連続焼鈍酸洗方法において、

該冷間圧延ステンレス鋼板を焼鈍する前に、

(1) 重量濃度で0.5%以上5.0%以下のアルカリ物質及び50ppm以上1.0%以下のキレート剤を含有する溶液に浸漬して粗洗浄する工程と、

(2) 前記粗洗浄された冷間圧延ステンレス鋼板に付着している付着物を、重量濃度で0.5%以上5.0%以下のアルカリ物質及び50ppm以上1.0%以下のキレート剤を含有する溶液で電解除去して仕上洗浄する工程と、

(3) 前記仕上洗浄された冷間圧延ステンレス鋼板に付着している溶液を除去する工程と、

(4) 前記溶液が除去された冷間圧延ステンレス鋼板を乾燥する工程を含むことを特徴とする冷間圧延ステンレス鋼板の連続焼鈍酸洗方法。

【請求項2】 焼鈍炉を備えた冷間圧延ステンレス鋼板の連続焼鈍酸洗装置において、前記焼鈍炉の前記冷間圧延ステンレス鋼板通路上流側に、

(1) 前記冷間圧延ステンレス鋼板を洗浄するアルカリ浸漬槽と、

(2) 該浸漬槽で洗浄された冷間圧延ステンレス鋼板をさらに洗浄するアルカリ電解槽と、

(3) 該アルカリ電解槽で洗浄された冷間圧延ステンレス鋼板に付着しているアルカリ溶液を除去するリンス槽と、

(4) 該リンス槽でアルカリ溶液を除去された冷間圧延ステンレス鋼板を乾燥する乾燥機とを備えたことを特徴とする冷間圧延ステンレス鋼板の連続焼鈍酸洗装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、冷間圧延後のステンレス鋼板の連続焼鈍酸洗方法及び装置に関する。

【0002】

【従来の技術】 冷間圧延後のステンレス鋼板は、従来APL（ステンレス鋼板連続焼鈍酸洗装置）によって焼鈍-酸洗処理が施されている。この従来のAPLを使用した連続焼鈍酸洗について図2を参照して説明する。図示しないベイオフリールと入り側ルーバを経由してきた冷間圧延ステンレス鋼板は、焼鈍炉10において所定の温度で焼鈍される。この焼鈍炉は直火型炉であり、酸化性雰囲気となっている。

【0003】 一般に焼鈍温度は、オーステナイト系ステンレスの場合は1100～1200℃の範囲、フェライト系ステンレスの場合は800～900℃の範囲である。上記温度範囲で焼鈍された冷間圧延ステンレス鋼板は、冷却帯12で冷却された後、中性塩、硫酸、硝酸、硝酸酸等の組み合わせせからなる酸を含んだ酸洗設備

2

14により酸化スケールが除去され、図示しない出側ルーバを経て巻き取られる。

【0004】

【発明が解決しようとする課題】 ところで、ステンレスの冷延鋼板は優れた表面光沢が要求され、表面の一部にでも光沢の悪い部分があるときは商品価値が低下するため、従来から優れた表面光沢を得るために種々の方法が試みられている。しかし、従来のAPLを使用した場合は、冷間圧延時にステンレス鋼板表面に圧延油、水、鉄粉、スケール等が不均一に付着しているため、焼鈍時にはこのステンレス鋼板表面が不均一に酸化され、焼鈍後に酸洗を行っても模様となって残存し、表面光沢が低下して製品の欠陥となる。この模様を除去するために酸洗いの程度を強くすると、粒界が酸化されて粒界模様が生じる。

【0005】 また、冷間圧延ステンレス鋼板表面に付着した鉄粉、スケール等が焼鈍炉のハースロールに付着することがあるため、焼鈍炉内での押し込みキズとなり製品欠陥となる場合がある。このような問題を解消するために、脱脂装置、洗浄装置を設置し、焼鈍前に冷間圧延ステンレス鋼板の表面を清浄にする方法が検討されているが、いずれもあまり効果を上げていないのが実情である。

【0006】 本発明は、上記事情に鑑み、冷間圧延ステンレス鋼板の焼鈍前に表面を十分に清浄にし、焼鈍後の酸洗いで再び清浄な表面にすることにより、表面光沢の優れたステンレス冷延鋼板を得る冷間圧延ステンレス鋼板の連続焼鈍酸洗方法及び装置を提供することを目的とする。

【0007】

【課題を解決するための手段】 本発明者は上記目的を達成するために種々の実験・研究を行った結果、焼鈍前の冷間圧延ステンレス鋼板を特定成分のアルカリ溶液で洗浄することにより十分清浄な表面が得られるため、焼鈍時はこの表面が均一に酸化されて焼鈍後の酸洗いにより酸化物が均一に除去され、この結果、表面光沢の優れたステンレス冷延鋼板が得られることを見出し、本発明をなすに至った。

【0008】 具体的には、本発明の冷間圧延ステンレス鋼板の連続焼鈍酸洗方法は、冷間圧延ステンレス鋼板を焼鈍する前に、

(1) 重量濃度で0.5%以上5.0%以下のアルカリ物質及び50ppm以上1.0%以下のキレート剤を含有する溶液に浸漬して粗洗浄する工程

(2) 粗洗浄された冷間圧延ステンレス鋼板に付着している付着物を、重量濃度で0.5%以上5.0%以下のアルカリ物質及び50ppm以上1.0%以下のキレート剤を含有する溶液で電解除去して仕上洗浄する工程

(3) 仕上洗浄された冷間圧延ステンレス鋼板に付着している溶液を除去する工程

(4) 溶液が除去された冷間圧延ステンレス鋼板を乾燥する工程を含むことを特徴とするものである。

【0009】この方法を行うための本発明の冷間圧延ステンレス鋼板の連続焼鈍酸洗装置は、焼鈍炉の冷間圧延ステンレス鋼板通路上流側に、

(1) 冷間圧延ステンレス鋼板を浸漬して洗浄するアルカリ浸漬槽

(2) この浸漬槽で洗浄された冷間圧延ステンレス鋼板をさらに洗浄するアルカリ電解槽

(3) このアルカリ電解槽で仕上洗浄された冷間圧延ステンレス鋼板に付着しているアルカリ溶液を除去するリンス槽

*

* (4) このリンス槽でアルカリ溶液を除去された冷間圧延ステンレス鋼板を乾燥する乾燥機を備えたことを特徴とするものである。

【0010】また、次に、本発明の基礎となった実験について、表1及び表2を参照して説明する。表1及び表2は、アルカリ浸漬槽及びアルカリ電解槽のアルカリ濃度、キレート剤濃度をさまざまに変更し、乾燥機出側から出たステンレス鋼板表面の調査結果を示したものである。

【0011】

【表1】

アルカリ濃度 (wt%)	キレート濃度 (wt%)	界面活性剤濃度 (wt%)	洗浄効果 (板表面分析結果)
0.3	30ppm	50ppm	鉄、スケール付着
0.3	50ppm	50ppm	鉄、スケール付着
0.3	200ppm	50ppm	鉄、スケール付着
0.3	1.0%	50ppm	鉄、スケール付着
0.3	3.0%	50ppm	鉄、スケール付着
0.5	30ppm	50ppm	鉄、スケール付着
0.5	50ppm	50ppm	良好
0.5	200ppm	50ppm	良好
0.5	1.0%	50ppm	良好
0.5	3.0%	50ppm	キレートの模様有
1.0	30ppm	50ppm	鉄、スケール付着
1.0	50ppm	100ppm	良好
1.0	200ppm	100ppm	良好
1.0	1.0%	100ppm	良好
1.0	3.0%	100ppm	キレートの模様有

【0012】

【表2】

アルカリ濃度 (wt %)	キレート濃度 (wt %)	界面活性剤濃度 (wt %)	洗 浄 効 果 (板表面分析結果)
3.0	30ppm	100ppm	鉄、スケール付着
3.0	50ppm	100ppm	良 好
3.0	200ppm	100ppm	良 好
3.0	1.0 %	100ppm	良 好
3.0	3.0 %	100ppm	キレートの模様有
5.0	30ppm	0.1 %	鉄、スケール付着
5.0	50ppm	0.1 %	良 好
5.0	200ppm	0.1 %	良 好
5.0	1.0 %	0.1 %	良 好
5.0	3.0 %	0.1 %	キレートの模様有
7.0	30ppm	0.1 %	アルカリ残り
7.0	50ppm	0.1 %	アルカリ残り
7.0	200ppm	0.1 %	アルカリ残り
7.0	1.0 %	0.1 %	アルカリ残り
7.0	3.0 %	0.1 %	アルカリ残り

【0013】表1及び表2から、圧延油、鉄、スケールをいずれも効率よく除去でき、鋼板表面を清浄にできるのは次のような濃度条件になることが判明した。

(1) アルカリ濃度 0.5%以上5.0%以下(重量濃度)

(2) キレート濃度 50ppm以上1.0%以下(重量濃度)

なお、特に限定していないが、界面活性剤は本実験では微量に溶液中に入っていればよく、濃度の上限も特にない。

【0014】

【作用】冷間圧延後のステンレス鋼板は、焼鈍前に、アルカリ浸漬槽に浸漬され粗洗浄される。さらに、その後、アルカリ電解槽で仕上洗浄され、リンス槽でこの鋼板に付着したアルカリ溶液が除去され、乾燥機で乾燥される。その後、焼鈍炉で焼鈍が施され、酸洗いされる。

【0015】上記のアルカリ浸漬槽とアルカリ電解槽には、それぞれ重量濃度で0.5%以上5%以下のアルカリ物質及び50ppm以上1.0%以下のキレート剤を含有する溶液が収容されているため、焼鈍前の冷間圧延ステンレス鋼板の表面は清浄度が高く圧延油、水、鉄粉、スケール等の付着はない。このため、焼鈍時には均一に酸化され、焼鈍後の酸洗いにより酸化物が均一に除去されるため、表面光沢の優れたステンレス冷延鋼板が得られる。しかも、上述のように焼鈍前の冷間圧延ス

テンレス鋼板の表面には鉄粉、スケール等の付着がないため、焼鈍炉のハースロールにこれらが付着することもなく、焼鈍炉内で鋼板表面に押し込みキズが生じることもない。

30 【0016】

【実施例】次に本発明の一実施例を図面を参照して説明する。図1は、本実施例の冷間圧延ステンレス鋼板の連続焼鈍酸洗装置20の概略構成を示す概略構成図である。図中の矢印Aは冷間圧延ステンレス鋼板が送られる方向を示す。

【0017】ベイオフィール(図示せず)を出た冷間圧延ステンレス鋼板22は、まずアルカリ溶液24が収容されたアルカリ浸漬槽26に浸漬され、その表面に付着している圧延油、水、鉄粉、スケール等が大まかに除去される。この浸漬槽26から出た冷間圧延ステンレス鋼板は、ナイロン製の柔らかいブラシを有した装置28により、その表面の付着物が強制的に除去される。次に、アルカリ溶液30が収容されたアルカリ電解槽32に浸漬される。このアルカリ電解槽32では、浸漬槽26で除去されずに鋼板表面に残っていた付着物が、電気分解により発生した H_2 、 O_2 ガスの攪拌力によりこの表面から除去される。このアルカリ電解槽32から出た冷間圧延ステンレス鋼板は、ナイロン製の柔らかいブラシを有した装置34により、その表面に付着物があるときは強制的に除去される。

50

【0018】この2つの槽26、32で付着物を除去された鋼板は、リンス槽36内を通過する。このリンス槽36内では、鋼板に付着しているアルカリ溶液の除去が行われる。その後、鋼板はドライヤ38で乾燥され、焼鈍炉（図示せず）に送られ所定の温度で焼鈍が施され *

＊る。焼鈍が終了した後は酸洗いが施され、焼鈍中に生じたスケール等が除去される。

【0019】次に、連続焼鈍酸洗装置を使用して、下記の（１）～（５）の条件で冷間圧延ステンレス鋼板を連続焼鈍酸洗した例を示す（濃度は重量％で示す）。

(1) アルカリ浸漬槽	アルカリ濃度	3.0%
	キレート濃度	200ppm
	温度	80℃
(2) アルカリ電解槽	アルカリ濃度	1.5%
	キレート濃度	200ppm
	温度	80℃
(3) リンス槽	温度	85℃
(4) ドライヤ	温風温度	90℃
(5) ライン速度		80m/min

上記の条件で連続焼鈍酸洗した結果、水ぬれ性100%良好な鋼板表面が得られた。しかも、鋼板表面のマイクロ分析の結果、鉄粉、スケール、油成分の検出は全く認められなかった。

【0020】また、焼鈍後、酸洗後の鋼板表面には、付着物に起因する模様は全く見られず、表面光沢の優れたステンレス冷延鋼板が得られた。なお、上記実施例では、アルカリ液としてNaOH水溶液、キレートとしてエチレンジアミル四酢酸（EDTA）を用いた。

【0021】

【発明の効果】以上説明したように本発明によれば、冷間圧延ステンレス鋼板の焼鈍前にこの表面を清浄にするため、付着物起因による焼鈍、酸洗後の異常酸化、模様が皆無になる。また、付着物起因による焼鈍炉ハースロール疵が皆無になる。しかも、アルカリ濃度、キレート濃度を管理することにより、アルカリ物質やキレート剤※30

※の原単位が改善される。

【図面の簡単な説明】

【図1】本発明の一実施例の冷間圧延ステンレス鋼板の連続焼鈍酸洗装置の概略構成を示す概略構成図である。

【図2】従来のステンレス鋼板連続焼鈍酸洗装置を示す概略構成図である。

【符号の説明】

20 連続焼鈍酸洗装置

22 冷間圧延ステンレス鋼板

24 アルカリ溶液

26 アルカリ浸漬槽

28、34 ナイロン製の柔らかいブラシを有した装置

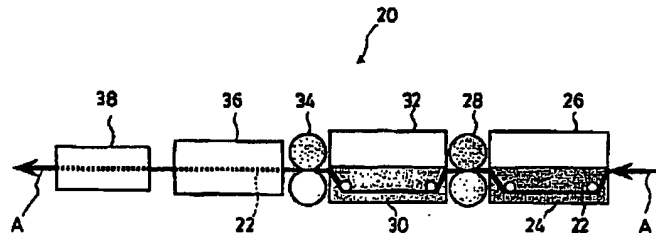
30 アルカリ溶液

32 アルカリ電解槽

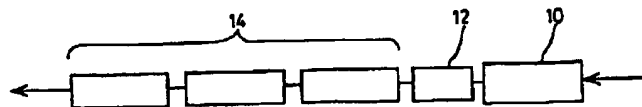
36 リンス槽

38 ドライヤ

【図1】



【図2】



フロントページの続き

(72)発明者 佐藤 邦昭
千葉市中央区川崎町1番地 川崎製鉄株式
会社千葉製鉄所内

(72)発明者 磯部 敏樹
千葉市中央区川崎町1番地 川崎製鉄株式
会社千葉製鉄所内
(72)発明者 園山 光吉
千葉市中央区川崎町1番地 川崎製鉄株式
会社千葉製鉄所内

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:**

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.